

Error Propagation

A. Summation or subtraction

For

$$q = x + y + \dots + z - (u + \dots w)$$

Then

$$\delta q = \sqrt{(\delta x)^2 + (\delta y)^2 + \dots + (\delta z)^2 + (\delta u)^2 + \dots + (\delta w)^2}$$

B. Multiplication and division

For

$$q = \frac{x \times y \times \dots \times z}{u \times \dots \times w}$$

Then

$$\frac{\delta q}{q} = \sqrt{\left(\frac{\delta x}{x}\right)^2 + \left(\frac{\delta y}{y}\right)^2 + \dots + \left(\frac{\delta z}{z}\right)^2 + \left(\frac{\delta u}{u}\right)^2 + \dots + \left(\frac{\delta w}{w}\right)^2}$$

C. Power

For

$$q = x^n$$

Then

$$\frac{\delta q}{|q|} = |n| \frac{\delta x}{|x|}$$

D. Constants

For

$$q = Bx$$

Then

$$\delta q = |B|\delta x$$